

Installation Guide

HP StorageWorks SAN Switch 2/8V 2/16V and 2/16N

Product Version: 4.2.x

Second Edition (April 2004)

Part Number: AA-RVULB-TE

This user guide provides procedures for setting up, configuring, and managing the SAN Switch 2/8V, SAN Switch 2/16V, and 2/16N models.



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SAN Switch 2/8V, 2/16V and 2/16N Installation Guide
Second Edition (April 2004)
Part Number: AA-RVULB-TE

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about this guide

This installation guide provides information to help you configure the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, and SAN Switch 2/16N.

Note: Throughout this guide, information about the SAN Switch 2/16V is applicable to the SAN Switch 2/16N, unless otherwise noted.

“About this Guide” topics include:

- [Overview](#), page 10
- [Conventions](#), page 11
- [Rack Stability](#), page 14

Overview

This section covers the following topics:

- [Intended Audience](#)
- [Related Documentation](#)

Intended Audience

This book is intended for use by system administrators and technicians who are experienced with the following:

- Configuration aspects of customer Storage Area Network (SAN) fabric
- Customer host environment, such as Microsoft Windows or IBM AIX
- Web Tools graphical user interface (GUI) for configuring the switches through a supported web browser

Related Documentation

Documentation, including white papers and best practices documents, is available via the HP website. Please go to:

<http://www.hp.com/country/us/eng/prodserv/storage.html>.

To access SAN Switch related documents:

1. Locate the **Networked storage** section of the web page.
2. Under **Networked storage**, go to the **By type** subsection.
3. Click **SAN infrastructure**. The SAN infrastructure page displays.
4. Locate the **Fibre Channel Switches** section.
5. Locate the **B-Series Fabric** subsection, then go to the **Entry-level** subsection.
6. Select **SAN Switch 2/8V**, **SAN Switch 2/16V** or **SAN Switch 2/16N**. The switch overview page displays.
7. Go to the **product information section**, located on the far right side of the web page.
8. Click **technical documents**.
9. Follow the onscreen instructions to download the applicable documents.

Conventions

Conventions consist of the following:

- [Document Conventions](#)
- [Text Symbols](#)
- [Equipment Symbols](#)

Document Conventions

The document conventions included in [Table 1](#) apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key and field names, menu items, buttons, and dialog box titles	Bold
File names, application names, and text emphasis	<i>Italics</i>
User input, command and directory names, and system responses (output and messages)	Monospace font COMMAND NAMES are uppercase monospace font unless they are case sensitive
Variables	<monospace, italic font>
Web site addresses	Blue, underlined sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings.



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.



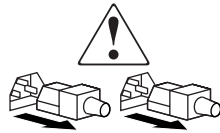
Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personnel and equipment.



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - In single rack installations, the stabilizing feet are attached to the rack.
 - In multiple rack installations, the racks are coupled.
 - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: <http://www.hp.com>.

HP Technical Support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.

Overview

1

The SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N are Fibre Channel Gigabit switches that support link speeds up to 2 Gb/sec. They can operate in a fabric containing multiple switches or as the only switch in a fabric.

The SAN Switch 2/16N is identical to the 2/16V; however, the SAN Switch 2/16N includes a full-fabric license.

Note: Unless otherwise noted, functionality and features for the 2/16V are applicable to the 2/16N throughout this guide.

This chapter provides the following information:

- [SAN Switch 2/8V, 2/16V and 2/16N Features](#), page 18
- [Switch Characteristics](#), page 20
- [ISL Trunking Groups](#), page 22
- [Supported \(Optional\) Features](#), page 23

SAN Switch 2/8V, 2/16V and 2/16N Features

The SAN Switch 2/8V, 2/16V and 2/16N provide the following features:

- Air-cooled 1U chassis. The chassis can be installed as a stand-alone unit or mounted in a standard Electronic Industries Association (EIA) 19 in. (48.26 cm) cabinet.
- 8 or 16 Fibre Channel ports, with the following characteristics:
 - Automatic negotiation to the highest common speed of all devices connected to port.
 - Port interfaces compatible with small form factor pluggable (SFP) transceivers, both short wavelength (SWL) and long wavelength (LWL).
 - Universal and self-configuring ports: capable of becoming an F_Port (fabric enabled), FL_Port (fabric loop enabled), or E_Port (expansion port).
- 8 or 16 short wavelength SFP transceivers (optional).
- One RS-232 serial port, designed to connect to a DTE port.
- One 10/100 Mb/sec Ethernet port with an RJ-45 connector.
- One (SAN Switch 2/8V) or two (SAN Switch 2/16V) built-in power supplies.
- The following light-emitting diodes (LEDs):
 - Power status
 - System status
 - Ethernet status
 - Port status and port speed for each port

SAN Switch 2/8V and 2/16 Switches Comparison

The basic difference between the SAN Switch 2/8V and the SAN Switch 2/16V is the number of ports: the SAN Switch 2/8V contains 8 ports, while the SAN Switch 2/16V contains 16. The SAN Switch 2/8V contains only 1 power supply while the SAN Switch 2/16V has built-in redundancy and contains 2 power supplies; thus, the SAN Switch 2/16V also weighs more.

The SAN Switch 2/16V can operate indefinitely on either one of its power supplies.

SAN Switch Licensing

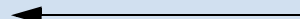
The SAN Switch 2/8V, 2/16V and 2/16N are switches based on existing HP product lines but with limits placed on the number of domains that can be used.

- The SAN Switch 2/8V comes configured from the factory with a 2-domain fabric license. Customers can purchase a full-fabric license.
- The SAN Switch 2/16V comes configured from the factory with a 2-domain fabric license. Customers can purchase a 4-domain fabric license or a full-fabric license.
- The SAN Switch 2/16N comes configured from the factory with a full-fabric license.

The SAN Switch 2/8V and 2/16V products can be upgraded by purchasing an optional license; refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide* to learn how to upgrade a license.

To determine the type of licensing your SAN Switch 2/8V or SAN Switch 2/16V run, use the **licenseshow** command.

```
switch:root> licenseshow
XXXnnXXnXnnXXX:
    Fabric Watch license
    Release v4.2 license
XXXnnXXnXnnXXX:
    Zoning license
XXXnnXXnXnnXXX:
    Web license
XXXnnXXnXnnXXX:
    2 Domain Fabric license
```



Switch Characteristics

The next few sections describe the physical characteristics of the SAN Switch 2/8V, 2/16V and 2/16N and some important requirements for proper operation.

Port Side

You can see the physical differences between the SAN Switch 2/8V and the SAN Switch 2/16V switches in the following figures. The most noticeable difference is the number of ports. [Figure 1](#) shows the port side of the SAN Switch 2/8V, and [Figure 2](#) shows the port side of the SAN Switch 2/16V.

All LEDs are on the port side of the switch: the nonport side is used for serial number labeling and to allow the free flow of air. The SAN Switch enclosures have forced-air cooling, with the fans pushing the air from the nonport side of the chassis through the enclosure, and exhausting to the port side.

A complete description of the locations and interpretations of these LEDs can be found at “[Interpreting LED Activity](#)” on page 59.

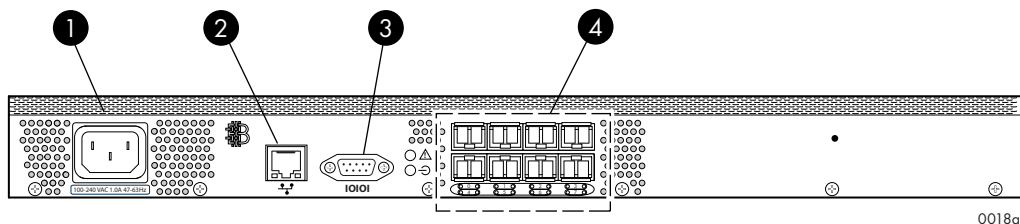


Figure 1: Port Side of SAN Switch 2/8V

[Table 2](#) lists the SAN Switch 2/8V port side components.

Table 2: SAN Switch 2/8V port side components

Number	Description
❶	AC power receptacle
❷	Ethernet port
❸	Serial port
❹	FC ports (8)

As shown in [Figure 2](#), the SAN Switch 2/16V and SAN Switch 2/16N has twice the number of ports and a second AC power receptacle.

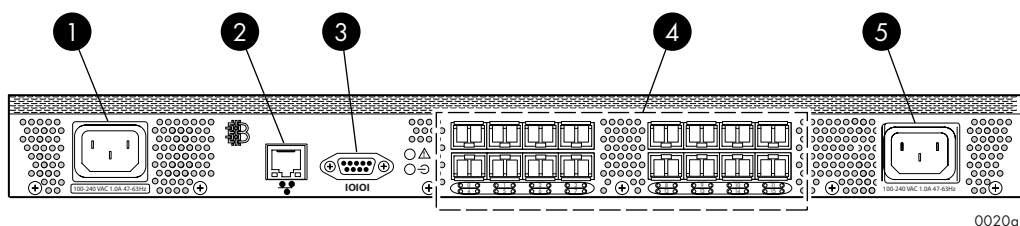


Figure 2: Port Side of the SAN Switch 2/16V and 2/16N

Note: The SAN Switch 2/16N has the same characteristics as the 2/16V.

[Table 3](#) lists the SAN Switch 2/16V port side components.

Table 3: SAN Switch 2/16V and 2/16N port side components

Number	Description
①	AC power receptacle
②	Ethernet port
③	Serial port
④	FC Ports (16)
⑤	Second AC power receptacle

Nonport Side of SAN Switch 2/8V, 2/16V and 2/16N

The nonport side of the SAN Switch 2/8V, 2/16V and 2/16N is used solely for air flow and for serial number labels. There are two labels on the rear of the chassis; both contain a serial number label for the switch; the left label also contains the 2/8V and 2/16V MAC address and WWN.

ISL Trunking Groups

If your SAN Switch 2/8V, 2/16V and 2/16N switch is licensed for ISL trunking, use the trunking groups available on the switch.

The Fibre Channel ports are numbered from left to right, color-coded into groups of four to indicate the groups of ports that can be used in the same interswitch link (ISL) trunking group. The trunking groups are the two or four sets of four ports at the top or at the bottom of the group, as shown in [Figure 3](#).

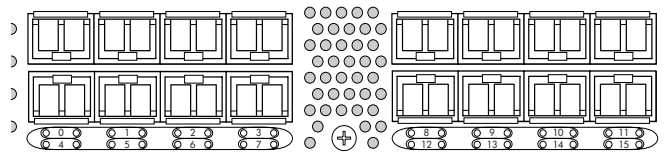


Figure 3: Trunking groups

Note: ISL Trunking is optional software that allows you to create trunking groups of ISLs between adjacent switches. For more information about trunking, refer to the *HP StorageWorks Features 4.2x User Guide*.

Supported (Optional) Features

The SAN Switch 2/8V, 2/16V and 2/16N support the following optional software that can be activated with the purchase of the corresponding license key.

Note: The SAN Switch 2/16N comes configured from the factory with a full-fabric license, Advanced Zoning and Web Tools features. If you purchased a SAN Switch 2/16N power pack, it also includes the following optional software.

- ISL Trunking
- Fabric Watch
- Advanced Performance Monitoring
- Extended Fabrics
- Remote Switch

For information on any of these features, refer to the *HP StorageWorks Features 4.2x User Guide*.

Optional Hardware Kits

Table 4 lists optional hardware kits that support of the SAN Switch 2/8V, 2/16V and 2/16N.

Table 4: Orderable Hardware

Accessory	Part Number
Short wavelength SFP	A6515A* or 300834-B21**
Long wavelength SFP, 10 km	A6516A* or 300835-B21**
Long wavelength SFP, 35 km	300836-B21**
2m LC-to-LC Fibre Channel (fc) cable	C7524A*
2m LC-to-LC multi-mode fc cable	221692-B21**
16m LC-to-LC fc cable	C7525A*
5m LC-to-LC multi-mode fc cable	221692-B22**
50m LC-to-LC fc cable	C7526A*
15m LC-to-LC multi-mode fc cable	221692-B23**
200m LC-to-LC fc cable	C7527A*
30m LC-to-LC multi-mode fc cable	221692-B26**
50m LC-to-LC multi-mode fc cable	221692-B27**
2m LC-to-SC fc cable	C7529A*
2m LC-to-SC multi-mode fc cable	221691-B21**
16m LC-to-SC fc cable	C7530A*
5m LC-to-SC multi-mode fc cable	221691-B21**
15m LC-to-SC multi-mode fc cable	221691-B23**
30m LC-to-SC multi-mode fc cable	221691-B26**
50m LC-to-SC multi-mode fc cable	221691-B27**
SC female to SC female adapter	C7534A*
2m LC male to SC male adapter kit	C7534A*

* premerger HP part number

** premerger Compaq part number

Installing the SAN Switch

2

This chapter provides the following information:

- [Items Included with the SAN Switch 2/8V, 2/16V and 2/16N](#), page 26
- [Installation and Safety Considerations](#), page 29
- [Installing a Stand-Alone SAN Switch 2/8V, 2/16V and 2/16N](#), page 31
- [Installing a SAN Switch 2/8V, 2/16V or 2/16N Into an EIA Cabinet](#), page 32
- [Cabling and Configuring the SAN Switch 2/8V, 2/16V or 2/16N](#), page 47
- [Items Required for Installation](#), page 48

Items Included with the SAN Switch 2/8V, 2/16V and 2/16N

The following items are included with the standard shipment of the SAN Switch 2/8V, 2/16V and SAN Switch 2/16N. When you open the product packaging, verify that these items are included in the package and that no damage has occurred during shipping:

- One SAN Switch 2/8V, SAN Switch 2/16V or SAN Switch 2/16N includes:
 - One cabinet-mountable 1U chassis designed to be mounted in a 19 inch cabinet space, with forced-air cooling that flows from the non-port side of the switch to the port side.
 - 8 or 16 Fibre Channel ports, compatible with SFP transceivers, SWL and LWL.
 - One RS-232 serial port (DB-9 connector).
 - One IEEE-compliant RJ-45 connector for use with 10/100 Mbps Ethernet or in-band.
 - LEDs as described in “[LED Location](#)” on page 60.
 - The SAN Switch 2/8V comes with one fixed power supply and built-in fans. The SAN Switch 2/16V comes with two fixed power supplies and built-in fans.
 - A real-time clock (RTC) with a 10-year battery.
 - Plenum, part number 5697-4919
- An accessory kit containing:
 - One or two grounded 6 ft. (1.8 m.) country-specific power cords, depending on the number of power supplies installed in the switch.
 - One or two grounded 10 ft. (3.0 m.) PDU power cords depending on the number of power supplies installed in the switch.
 - One 10 ft. (3.0 m.) RS-232 serial cable; if necessary, convert this RS-232 cable to an RJ-45 connector by removing the adapter on the end of the cable.
 - One HP StorageWorks SAN Switch Rack Mount Kit, with instructions.
 - The *HP StorageWorks SAN Switch 2/8V and 2/16V Installation Guide* (this document).

Shipping Carton Contents

Figure 4 shows the shipping carton contents.

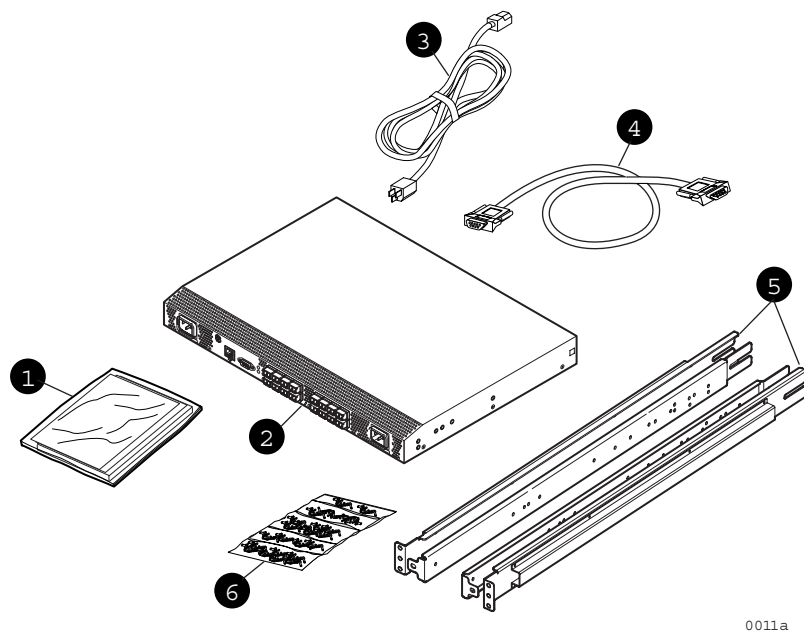


Figure 4: Shipping carton contents

Note: Throughout the rest of this guide, examples in figures show the SAN Switch 2/16V, unless otherwise noted.

Table 5 lists the contents included with your SAN Switch 2/8V, 2/16V or 2/16N.

Table 5: Shipping Carton Contents

Item Number	Description
①	One set of HP StorageWorks SAN Switch product documentation including Read Me First document, Installation Guide, Safety Guides, User License and Warranty
②	One HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, or SAN Switch 2/16N.
③	One standard AC power cord, and one PDU cord for the SAN Switch 2/8V. The SAN Switch 2/16V includes two AC power cords and two PDU cords (not shown).
④	One RS-232 Serial cable
⑤	Rail assemblies and hardware: <ul style="list-style-type: none"> ■ (2) rear mounting brackets ■ A right inner rail and a right outer rail ■ A left inner rail and a left outer rail
⑥	Rack Mount hardware pouch: <ul style="list-style-type: none"> ■ (14) #8-32 x 3/16-inch Phillips pan-head screws with thread lock for the SAN Switch 2/32 only ■ (14) #8-32 x 5/16-inch pan-head SEMS screws for use with the SAN Switch 2/8, SAN Switch 2/8V, SAN Switch 2/16, SAN Switch 2/16V and SAN Switch 2/16N. ■ (10) #10-32 x 1/2-inch Phillips pan-head screw with captive star lock washer ■ (8) #10 alignment washer ■ 8) #10 adapter washer ■ (2) 1/4-20 hex nut with captive star lock washer ■ (2) 1/4-inch flat washer
Plenum (Not shown)	Part number 5697-4919

Installation and Safety Considerations

You can install the SAN Switch 2/8V or 2/16V using one of the following methods:

1. As a stand-alone unit on a flat surface.
2. In an Electronic Industries Association (EIA) cabinet using a sliding rail rack mount kit, which is provided with the switch.

Electrical Considerations

For successful installation and operation of the switch, ensure that the following electrical requirements are met. For power supply information, refer to “[Technical Specifications](#)” on page 87.

- Primary AC input 100-240 VAC (switch auto-senses input voltage), 47-63 Hz.
- Correctly wired primary outlet, with circuit protected by a circuit breaker and grounded in accordance with local electrical codes.
- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate.

Environmental Considerations

- At a minimum, adequate cooling requires that you install the switch with the non-port side, which contains the air intake vents, facing the cool-air aisle.
- Verify that a minimum of 24 cubic ft./minute of air flow is available to the air intake vents on the nonport side of the switch.
- Verify that the ambient air temperature does not exceed 40° C (104° F) while the switch is operating.
- If installing the switch in a cabinet:
 - The cabinet must be a standard EIA cabinet.
 - Plan a cabinet space that is 1 rack unit (1.75 inches; 4.45 cm) high, 19 inches (48.3 cm) wide, and at least 30 inches (76.2 cm) deep.
 - Ground all equipment in cabinet through a reliable branch circuit connection and maintain ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.

- Ensure that airflow and temperature requirements are met on an ongoing basis, particularly if the switch is installed in a closed or multicabinet assembly.
- Verify that the additional weight of the switch does not exceed the cabinet's weight limits or unbalance the cabinet in any way.
- Secure the cabinet to ensure stability in case of unexpected movement, such as an earthquake.

Installing a Stand-Alone SAN Switch 2/8V, 2/16V and 2/16N

To install the SAN Switch as a stand-alone unit, follow the procedure described here:

1. Unpack the switch and verify that all items listed on “[Shipping Carton Contents](#)” on page 27 are present and undamaged.
2. Apply the adhesive rubber feet. Applying the rubber feet in the switch helps prevent the switch from sliding off the supporting surface.
 - a. Clean the indentations at each corner of the bottom of the switch to ensure that they are free of dust or other debris that might lessen the adhesion of the feet.
 - b. With the adhesive side against the chassis, place one rubber foot in each indentation and press into place.
3. Place the switch on a flat, sturdy surface.
4. Provide power to the switch as described in “[Powering the Switch On and Off](#)” on page 58.



Caution: Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see “[Cabling and Configuring the SAN Switch 2/8V, 2/16V or 2/16N](#)” on page 47.

Installing a SAN Switch 2/8V, 2/16V or 2/16N Into an EIA Cabinet

The rack mount kit can be installed in two ways:

- To allow the port side of the switch to slide out of the exhaust-air side of the cabinet.

In this installation, the port side of the switch is flush with the edge of the cabinet.

- To allow the nonport side of the switch to slide out the cool-air side of the cabinet.

In this installation, the port side of the switch is set 3 in. (7.62 cm.) back from the edge of the cabinet, allowing a more gradual bend in the fiber optic cables.

Follow the installation instructions in the following sections.

Selecting an Operating Location

To ensure correct operation of the switch, the location must meet the following requirements:

- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate.
- An air flow of at least 300 cubic feet per minute, available in the immediate vicinity of the switch.
- If installing the switch in the HP 10000 Series, or comparable EIA cabinet:
 - All equipment installed in the cabinet should have a reliable branch circuit ground connection, and should not rely on a connection to a branch circuit, such as a power strip.
 - The cabinet should be balanced and the installed equipment should be within the cabinet's weight limits. Ensure the cabinet is mechanically secured to insure stability in the event of an earthquake.

Cooling Requirements

Cooling air is drawn into the switch chassis by the fans mounted on the rear of the chassis. The air is expelled through vents in the front (port side) of the chassis, next to the HP logo. HP recommends installing the switch so that air intake and exhaust for all components in the rack are flowing in the same front-to-back direction.

Note: HP highly recommends mounting the switch in a cabinet or rack so that the fans reside in the front of the cabinet, and the ports (cables) reside in the rear of the cabinet.

Follow these guidelines to ensure proper air flow, and prevent component overheating:

- To ensure adequate cooling, install the switch with the non-port side, which contains the air intake vents, facing the cool-air aisle.
- Verify a minimum of 47 cubic feet/minute (79.8 cubic meters/hour) of air flow is available to the air intake vents on the non-port side of the switch.
- Verify that the ambient air temperature does not exceed 40° Celsius (104° Fahrenheit) while the switch is operating.



Caution: Do not block air vents. The switch uses ambient air for cooling.

Power Requirements

The AC power source must meet these requirements:

- Primary AC Input 100–240 VAC (switch auto-senses input voltage) 47–63 Hz
- Correctly wired primary outlet, with circuit protected by a circuit breaker and grounded in accordance with local electrical codes
- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate
- Voltage capability of 85–264 VAC
- Input voltage frequency of 47–63 Hz
- Power capability of 75 W minimum

Installing the Switch in a Rack Using the SAN Switch Rack Mount Kit

This section provides instructions for installing the switch in an HP System/e cabinet, or in an HP 10000 series cabinet using the HP StorageWorks SAN Switch Rack Mount Kit supplied with your switch. The Rack Mount Kit installation requires one technician to install a SAN Switch.

Note: The Rack Mount Kit installation requires one technician.

The following items are required to install the switch in a cabinet:

- SAN Switch 2/8V, SAN Switch 2/16V or SAN Switch 2/16N
- Power cables
- #2 Phillips screwdriver
- 7/16-inch wrench or socket

The SAN Switch Rack Mount Kit rails and rail mounting hardware listed in [Table 6](#):

Table 6: Rack Mount Kit rails and rail mounting hardware

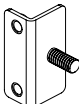

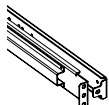
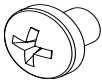
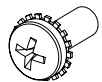


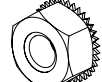

Item	Description
	(2) rear mounting brackets
	A right inner rail and a right outer rail
	A left inner rail and a left outer rail

Table 6: Rack Mount Kit rails and rail mounting hardware (Continued)

Item	Description
	<p>(14) #8-32 x 3/16-inch Phillips pan-head screw with thread lock for the SAN Switch 2/32 only</p> <p>(14) 8-32 x 5/16-inch Phillips pan-head SEMS screw for use with the SAN Switch 2/8, SAN Switch 2/8V, SAN Switch 2/16, SAN Switch 2/16V and SAN Switch 2/16N (screw not shown here).</p>
	<p>(10) #10-32 x 1/2-inch Phillips pan-head screw with captive star lock washer</p>
	<p>(8) #10 alignment washer</p>
	<p>(8) #10 adapter washer</p>
	<p>(2) 1/4-20 hex nut with captive star lock washer</p>
	<p>(2) 1/4-inch flat washer</p>



Caution: For proper air flow, the SFP media side of the SAN Switch 2/8V or SAN Switch 2/16V must face the rear of the rack. This mounting allows air to enter from the front of the rack and to exhaust at the rear of the rack, similar to other rack-mounted equipment. This prevents switch overheating, which may cause it to fail.

To install the switch in a rack:

1. Check contents of the shipping carton to verify all the required parts and hardware are available.
2. Choose a mounting location in the rack for the switch.
3. Attach the rear mounting brackets to the rear rack uprights by completing one of the following steps:
 - For an HP 10000 series or comparable EIA cabinet, assemble each of the two brackets with (2) #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and (2) #10 adapter washers as shown in [Figure 5](#).

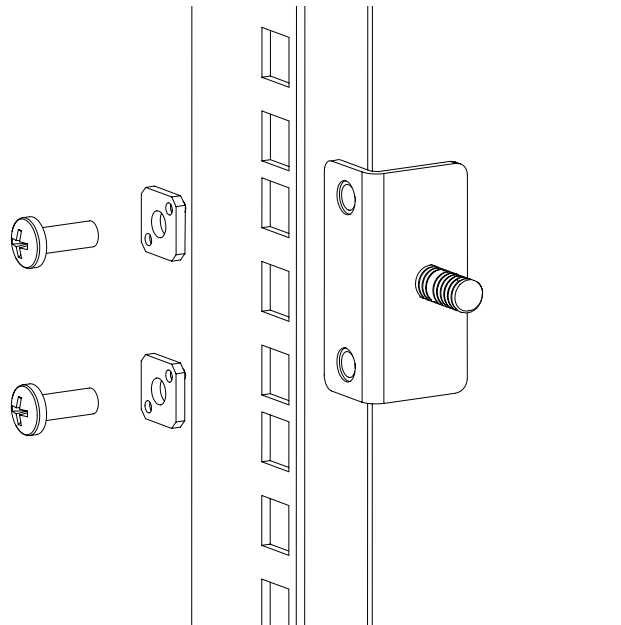


Figure 5: Installing the rear mounting brackets (HP 10000 series or comparable EIA cabinet)

- For an HP System/e rack, install each of the two rear mounting brackets with (2) #10-32 x 1/2-inch Phillips pan-head screws and (2) #10 alignment washers as shown in [Figure 6](#).

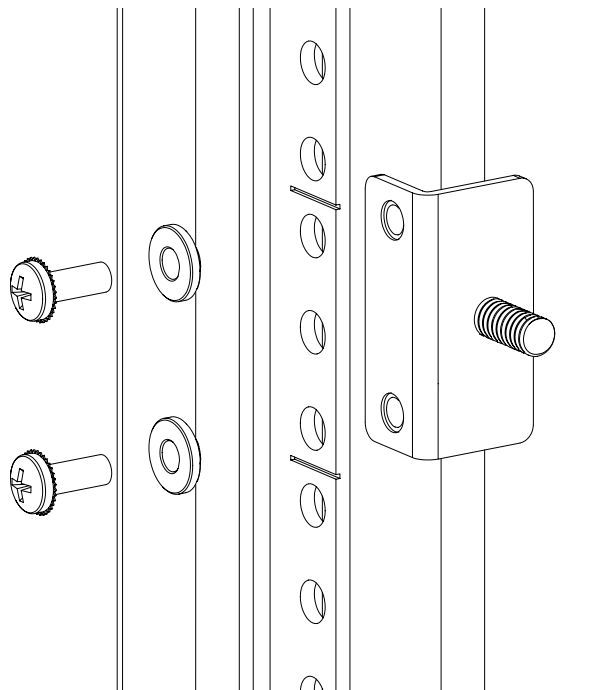


Figure 6: Installing the rear mounting brackets (HP System/e rack-left rear upright)

Note: This kit contains both left rails and right rails. The rails are marked with *Right* and *Left*.

4. Assemble the outer rails by completing the following steps:

- a. Attach the left outer rail and the right outer rails to the rear mounting brackets using (2) 1/4-20 hex nuts with captive star lock washers attached loosely as shown in [Figure 7](#). Don't tighten them. The nuts will be tightened later in [step 8](#) on page 46.

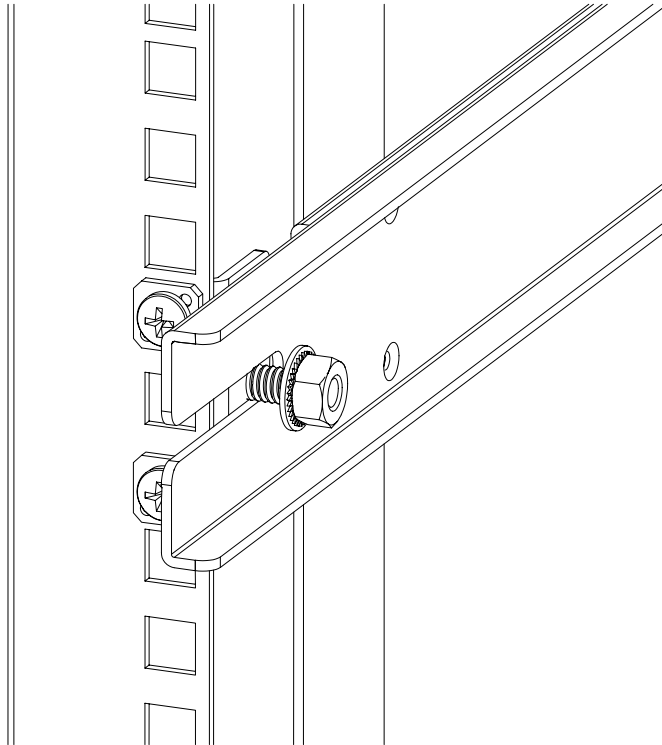


Figure 7: Installing the outer rails (HP 10000 series or comparable EIA cabinet)

- b. Depending on the rack you are using, complete one of the following tasks:
 - For an HP 10000 series or comparable EIA cabinet, install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 adapter washers in the upper and lower hole locations of the right rail. Then install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 adapter washers in the upper and lower hole locations of the left rail. See [Figure 8](#).

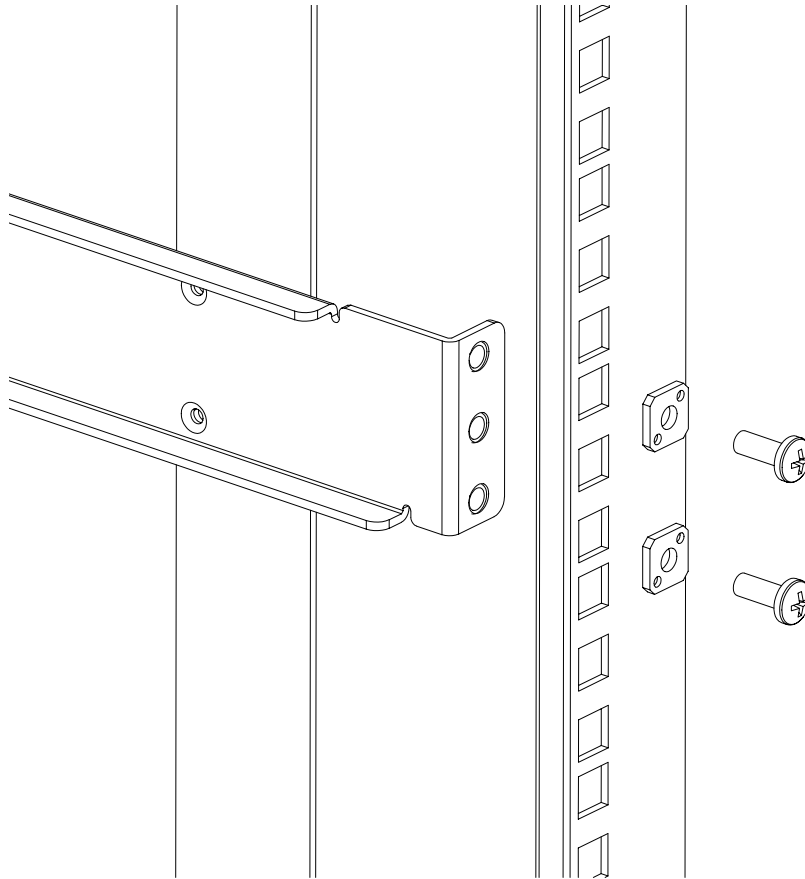


Figure 8: Assembling the outer rails (HP 10000 series or comparable EIA cabinet)

- For an HP System/e cabinet, install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 alignment washers in the upper and lower hole locations of the right rail. Then install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 alignment washers in the upper and lower hole locations of the left rail. See [Figure 9](#).

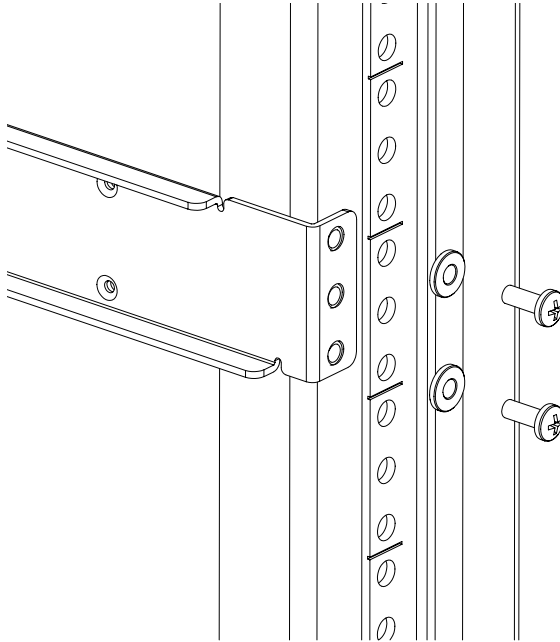


Figure 9: Assembling the outer rails (HP System/e cabinet)

5. Determine the number of #8-32 x 5/16-inch Phillips pan-head SEMS screws required to assemble the inner rails by referring to [Table 7](#).

Table 7: Number of screws required to assemble the inner rails

Switch	Number of #8-32 x 5/16-inch Screws
SAN Switch 2/16V, SAN Switch 2/16N	10
SAN Switch 2/8V	10

6. For the SAN Switch 2/16V, complete [step a](#) on page 43. For the SAN Switch 2/8V, complete [step b](#) on page 44.



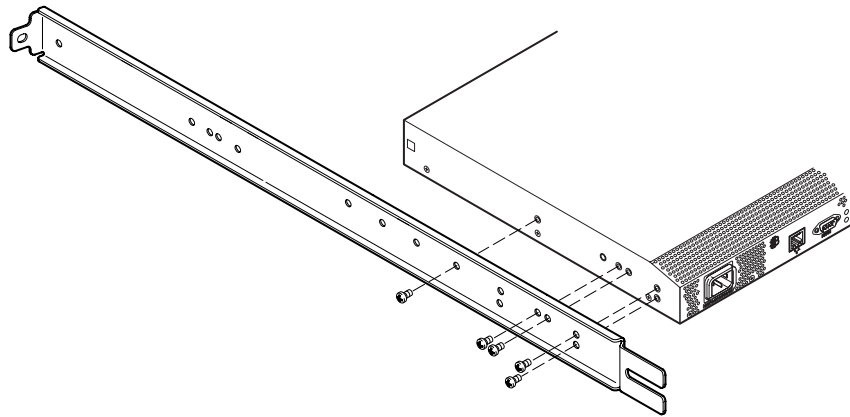
Caution: Do not use any screws other than the fourteen that are provided. Use of any longer lengths can cause damage to internal components.

Note: The mounting holes in the inner rails are marked with 32, 16, and 8. When mounting the SAN Switch 2/8V or SAN Switch 2/16V, use the mounting holes labelled 8 when installing the inner rails on the switch.

When viewing a rack from the front, the left rails are used in the left side of the rack and the right rails are used in the right side of the rack. The rails must match up—right inner with right outer and left inner with left outer. Note that the SAN Switch mounts in the rack with its front, the port side, facing the back of the rack. The rear of the switch, the AC side, faces the front of the rack.

- a. Assemble the two inner rails (one on each side) to the switch using the appropriate number (from [step 5](#) on page 42) of #8-32 x 5/16-inch Phillips pan-head SEMS screws as shown in [Figure 10](#).

Note: The rail kit provides fourteen #8-32 x 5/16-inch screws for assembling the inner rails. Each switch requires a different number of these screws. For example, [Figure 10](#) shows the an inner rail being attached to the SAN Switch 2/16V with five screws. Attaching both inner rails requires ten screws.



0012a

Figure 10: Assembling the inner rails

Note: For factory integration only, tighten the #8-32 x 5/16-inch Phillips pan-head SEMS screws and torque between 6 to 8 inch-pounds.

- b. For the SAN Switch 2/8V, assemble the two inner rails (one on each side) to the switch and plenum using the appropriate number (from [step 5](#) on page 42) of #8-32 x 5/16-inch Phillips pan-head SEMS screws as shown in [Figure 11](#).

Note: The plenum is a required part of this installation when the SAN switch 2/8V, SAN switch 2/16V or 2/16N are installed in an HP 9000 or 10000 series, System/e or comparable EIA cabinet.

The plenum allows air to dissipate at the rear of the rack, preventing overheating. If the Plenum is not pre-installed, refer to [step b](#) on page 44 for instructions.

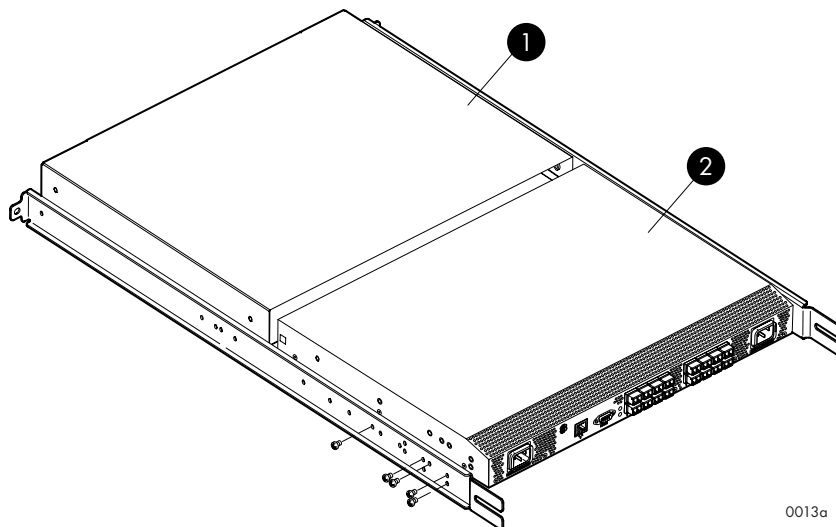


Figure 11: Assembling the inner rails on a SAN Switch with plenum

The components in [Figure 11](#) include:

①	Plenum
②	Switch

7. Insert the switch with the attached inner rails into the outer rails.

Note: This step applies to both the HP 10000 series, System/e cabinet or comparable EIA cabinets.

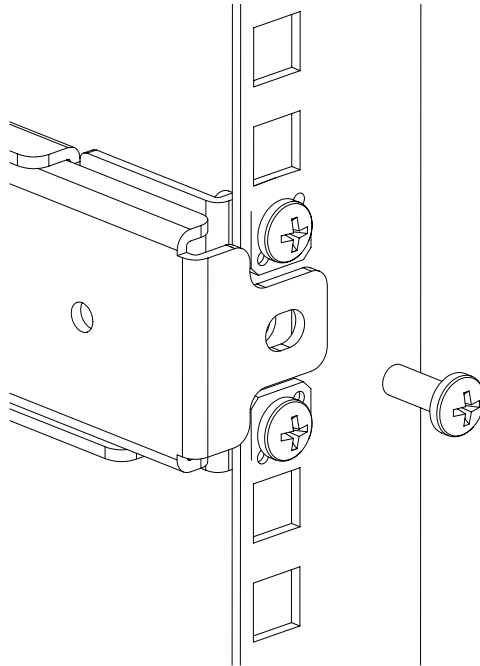


Figure 12: Installing the switch into a rack (HP 10000 series or comparable EIA cabinet)

Insert the switch into the rack and install (2) #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers with one on each side. See [Figure 12](#) and [Figure 13](#).

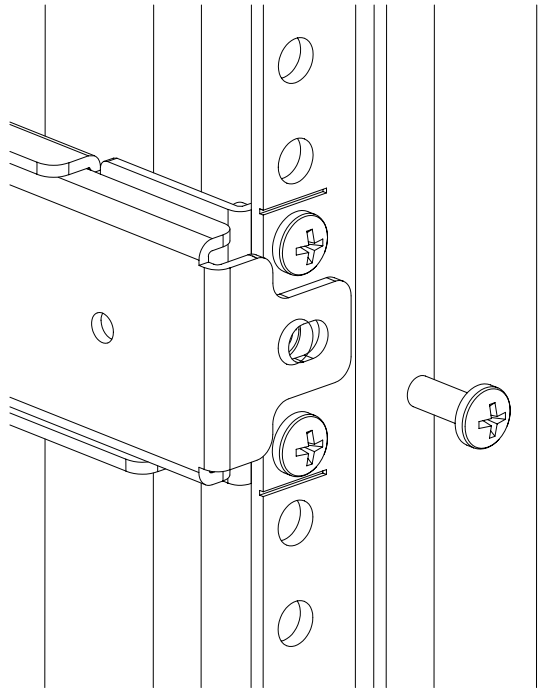


Figure 13: Installing the switch into a rack (HP System/e cabinet)

8. Tighten the nuts installed in [step a](#) on page 39 of [step 4](#) on page 39. See [Figure 7](#) on page 39.

Note: To uninstall a switch, remove the middle #10-32 x 1/2-inch Phillips pan head screw with captive star lock washer from either side of the rack uprights.

Cabling and Configuring the SAN Switch 2/8V, 2/16V or 2/16N

The SAN Switch 2/8V or 2/16V must be configured to ensure correct operation within a network and fabric. For instructions about configuring the switch to operate in a fabric containing switches from other vendors, refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide*.

For more information about the commands used in this procedure, refer to the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

Recommendations for Cable Management

The minimum bend radius for a 50 micron cable is 2 inches under full tensile load and 1.2 inches with no tensile load.

Cables can be organized and managed in a variety of ways: for example, using cable channels on the sides of the cabinet or patch panels to minimize cable management. Following is a list of recommendations:

- Plan for rack space required for cable management before installing the switch.
- Leave at least 3.28 ft. (1 m.) of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- If you are using ISL Trunking, consider grouping cables by trunking groups. The cables used in trunking groups must meet specific requirements, as described in the *HP StorageWorks Fabric OS Features 4.2.x User Guide*.
- For easier maintenance, label the fiber optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.
- Do not use tie wraps on fiber optic cables, because the wraps are easily overtightened and can damage the optic fibers. HP recommends using Filcrow wraps.

Items Required for Installation

The following items are required for configuring and connecting the SAN Switch 2/8V and SAN Switch 2/16V for use in a network and fabric:

- SAN Switch 2/8V and SAN Switch 2/16V installed and connected to a power source
- Workstation with an installed terminal emulator, such as HyperTerminal
- Unused IP address and corresponding subnet mask and gateway address
- Serial cable (provided)
- Ethernet cable
- SFP transceivers and compatible cables, as required
- Access to an FTP server for backing up the switch configuration (optional)

Configuring the SAN Switch 2/8V, 2/16V and 2/16N

Follow the steps described in the next sections to configure your SAN Switch 2/8V, 2/16V or 2/16N for use:

1. [Create a Serial Connection](#), page 49
2. [Power Up the Switch and Log In](#), page 50
3. [Set the IP Address](#), page 51
4. [Create an Ethernet Connection and Log In](#), page 52
5. [Modify the Fibre Channel Domain ID \(Optional\)](#), page 53
6. [Install the SFP Transceivers](#), page 54
7. [Connect the Cables](#), page 54

Create a Serial Connection

Before you can begin configuring the switch, you must create a connection via the serial port. To create a serial connection:

1. Insert the provided serial cable into the serial port on the switch.
2. Connect the serial cable to an RS-232 serial port on the workstation (Figure 14).

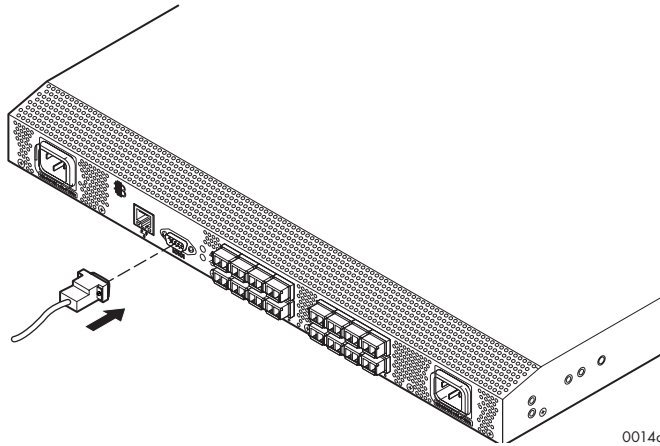


Figure 14: Connecting the serial cable

If the serial port on the workstation uses an RJ-45 connector instead of an RS-232, remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.

3. Disable any serial communication programs running on the workstation.

4. Open a terminal emulator application (such as HyperTerminal on a PC or TERM in a UNIX environment) and configure the application as follows:

- In a Windows 95, 98, 2000, or NT environment:

Bits per second	9600
Databits	8
Parity	None
Stop bits	1
Flow control	None

- In a UNIX environment, type the following string at the prompt:

```
tip /dev/ttyb -9600
```

Power Up the Switch and Log In

Once a serial connection is established, provide power to the switch; power is supplied to the switch as soon as the first power supply is connected and powered on:

1. Connect the power cords to both power supplies and power sources (Figure 15).

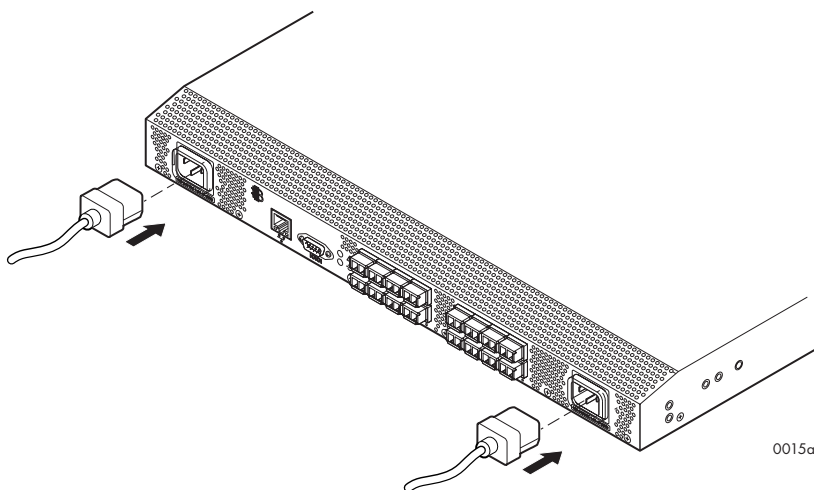


Figure 15: Connecting the power cords

To protect against AC failure, connect the power cords to outlets on separate circuits. Ensure that the cords have a minimum service loop of six inches available at the connection to the switch and are routed to avoid stress.

The power supply LED lights up green, and the switch begins running Power On Post Test (POST). POST should complete and the switch will complete the boot process in about three minutes.

2. After POST is complete, verify that the System Status and Power Status LEDs are green.
3. Using a serial connection, when the terminal emulator application stops reporting information, press **Enter** to display the login prompt.
4. Log in using the administrative account; the logon is “admin” and the default password is “password”. Up to two simultaneous admin sessions and four user sessions can be created. For details, refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide* and the *Fabric OS 4.2.x Command Reference Guide*.

Set the IP Address

Replace the default IP address and related information with the information provided by your network administrator. By default, the IP address is set to 10.77.77.77.

1. Type **ipaddrset** at the terminal emulator application prompt.
2. Type the requested information as prompted.

Example:

```
switch:admin> ipaddrset
Ethernet IP Address [192.168.1.1]:10.32.53.47
Ethernet Subnetmask [255.255.255.0]:255.255.240.0
Fibre Channel IP Address [0.0.0.0]:
Fibre Channel Subnetmask [0.0.0.0]:
Gateway IP Address [0.0.0.0]:10.32.48.1
Set IP address now? [y = set now, n = next reboot]:y
IP address being changed...
Committing configuration...Done.
switch:admin>
```

3. Optionally, verify that the address was correctly set by entering the **ipaddrshow** command at the prompt.
4. Record the IP address on the label clearly displayed on the port side of the chassis.

5. If the serial port is no longer required, log out of the serial console, remove the serial cable, and replace the safety plug in the serial port.

Note: Any time the port is not in use, the safety plug should be installed to protect it from foreign material.

Create an Ethernet Connection and Log In

Use these steps to create an Ethernet connection.

1. Connect an Ethernet cable to the Ethernet port and to the workstation or to an Ethernet network containing the workstation (Figure 16).

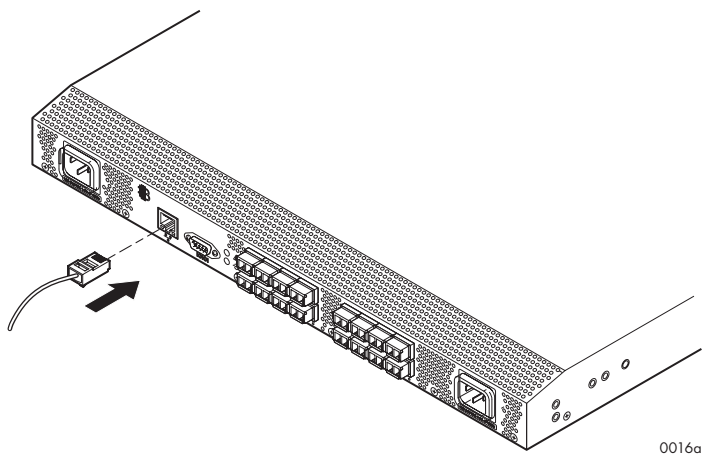


Figure 16: Connecting the Ethernet cable

After this connection is made, the switch can be accessed remotely, by command line or by Advanced Web Tools. Ensure that the switch is not being modified from any other connections during the remaining steps.

2. Log in to the switch by telnet, using the admin account.

Modify the Fibre Channel Domain ID (Optional)

If desired, you can modify the Fibre Channel domain ID. The default Fibre channel domain ID is domain 1. If the switch is not powered on until after it is connected to the fabric and the default Fibre channel domain ID is already in use, the domain ID for the new switch is automatically reset to a unique value. If the switch is connected to the fabric after it has been powered on and the default domain ID is already in use, the fabric segments.

The domain IDs that are currently in use can be determined using the **fabricshow** command. The number of domains is determined by your domain fabric licensing.

To modify the domain ID:

1. Disable the switch by typing **switchdisable**.
2. Type **configure**. This prompts display sequentially; type a new value or press **Enter** to accept each default value.
3. At the Fabric Parameters prompt, type **Y** and press **Enter**:

```
Fabric parameters (yes, y, no, n): [no] y
```

4. Enter a unique domain ID, such as the domain ID used by the previous switch, if still available:

```
Domain: (1..239) [1] 3
```

5. Complete the remaining prompts or press **Ctrl+D** to accept the remaining default settings.
6. Re-enable the switch by entering the **switchenable** command.
7. Optionally, specify any custom status policies:
 - a. Enter the **switchstatuspolicyset** command at the prompt. This command sets the policy parameters that determine the overall switch status.
 - b. Customize the status policies as desired.

To deactivate the alarm for a particular condition, enter **0** at the prompt for that condition.

Install the SFP Transceivers

The SAN Switch 2/8V, 2/16V and 2/16N do not ship with SFP transceivers, these are a saleable option.

Use the following procedure to install the SFP transceivers into the Fibre Channel ports. A list of supported SFPs can be found in “[Technical Specifications](#)” on page 87.

The ports selected for use in trunking groups must meet specific requirements. For a list of these requirements, refer to the *HP StorageWorks Fabric OS Features 4.2.x User Guide*.

To install SFP transceivers:

1. Position a transceiver so that it is oriented correctly and insert it into a port until the latching mechanism clicks. The transceivers are keyed to ensure correct orientation. If a transceiver does not install easily, ensure that it is correctly oriented.

For instructions specific to the type of transceiver, refer to the transceiver manufacturer’s documentation.

2. Repeat for the remaining ports, as required.

Connect the Cables



Caution: The minimum bend radius for a 50-micron cable is 2 inches under full tensile load, and 1.2 inches with no tensile load.

Because they are easily overtightened, tie wraps are not recommended for optical cables.

Connect the cables to the transceivers:

1. The cable connectors are keyed to ensure correct orientation. Orient a cable connector so that the key (ridge on one side of connector) aligns with the slot in the transceiver and insert cable into transceiver until latching mechanism clicks. If a cable does not install easily, ensure it is correctly oriented. For instructions specific to cable type, refer to the cable manufacturer’s documentation.
2. Repeat for the remaining transceivers, as required.

The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *HP StorageWorks Fabric OS Features 4.2.x User Guide*.

Verifying Configuration

After completing the configuration, use the LEDs and commands to verify that the configuration has been accepted:

1. Check the LEDs to verify that all components are functional. For information about LED patterns, refer to [“Interpreting LED Activity”](#) on page 59.
2. Verify the correct operation of the SAN Switch 2/8V and SAN Switch 2/16V by entering the **switchshow** command from the workstation. This command provides information about the switch and port status.
3. Verify the correct operation of the SAN Switch 2/8V and SAN Switch 2/16V in the fabric by entering the **fabricshow** command from the workstation. This command provides general information about the fabric.

Backing Up Your Configuration

HP recommends regular backups to ensure that a recent configuration is available for downloading to a replacement switch, if required. For specific instructions about how to back up the configuration, refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide*.

Back up the switch configuration to an FTP server by entering the **configupload** command and following the prompts. This command uploads the switch configuration to the server, making it available for downloading to a replacement switch, if necessary.

Managing the SAN Switches

3

This chapter provides the following information:

- [Powering the Switch On and Off](#), page 58
- [Interpreting LED Activity](#), page 59
- [LED Location](#), page 60
- [LED Patterns](#), page 62
- [POST and Boot Specifications](#), page 65
- [Interpreting POST Results](#), page 66

Powering the Switch On and Off

To apply power to the SAN Switch 2/8V or SAN Switch 2/16V, connect at least one power cable to an AC receptacle on the switch and to a power source. The switch runs POST (power-on self-test) by default each time it is powered on, reset, or rebooted, and requires as long as 3 minutes.

To end the flow of power to the SAN Switch 2/8V or SAN Switch 2/16V, remove the power cord from the power source.

Note: Removing all power from the switch triggers a system reset. All devices are returned to their initial state the next time the switch is powered on.

Interpreting LED Activity

System activity and status can be determined through the activity of the LEDs on the switch.

There are three possible LED states: no light, a steady light, and a flashing light. The steady lights and flashing lights can be green or amber.

The LEDs flash any of these colors during boot, POST, or other diagnostic tests. This is normal and does not indicate a problem unless the LEDs do not indicate a healthy state after all boot processes and diagnostic tests are complete. A healthy state is indicated by a steady green light. See [Table 10](#) on page 62 for details about LED activity.

LED Location

All 2/8V and 2/16V LEDs are located on the port side. They include:

- Switch Status
- Power
- Port Status
- Port Speed
- Ethernet

Figure 17 shows the port side of the SAN Switch 2/8V, paying special attention to the LEDs. Figure 17 shows the port side of the SAN Switch 2/16V.

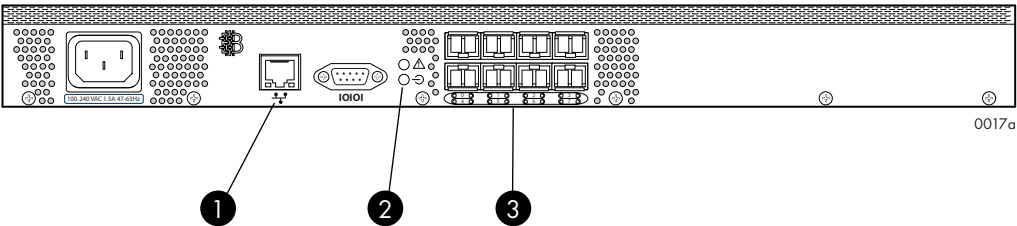


Figure 17: SAN Switch 2/8V LED locations

Table 8 lists the LEDs locations.

Table 8: SAN Switch 2/8V LED Locations

Component	Description
①	Ethernet LEDs
②	System and Power LEDs
③	Port LEDs

The 2/8V and 2/16V switches are physically similar except for the number of ports—and related port LEDs—and the second AC power receptacle.

All LEDs are on the port side of the switch. [Figure 18](#) shows the location of these LEDs. See “[LED Patterns](#)” on page 62 for details about interpreting LEDs.

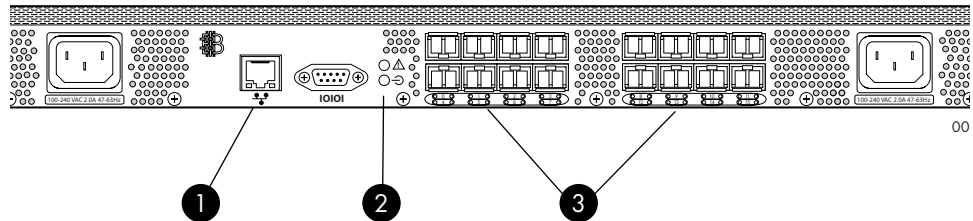


Figure 18: SAN Switch 2/16V LED locations

[Table 9](#) lists the LEDs locations.

Table 9: SAN Switch 2/16V LED Locations

Component	Description
①	Ethernet LEDs
②	System and Power LEDs
③	Port LEDs

LED Patterns

[Table 10](#) and [Table 11](#) summarize LED location, color, and meaning of the 2/8V and 2/16V LEDs, as well as any recommended user response.

System and Power LED Patterns

The system and power LED patterns are shown in [Table 10](#).

Table 10: System LED Patterns During Normal Operation

LED Name, Location	LED Color	Status of Hardware	Recommended Action
System Status and Power Status At right of serial port on bottom	No light	Switch is off, boot is not complete, or boot failed.	Verify that switch is on and has completed booting.
	Steady green	Switch is on and power supplies are functioning properly.	No action required.
	Slow-flashing green (on 1 second, off 1 second)	One or both of the following are true: One or more environmental ranges are exceeded. Error log contains one or more port diagnostic error messages.	Check environmental conditions, error log, Port Status LEDs, transceivers, cables, and loopback plugs. Correct error condition. Clear error log. Rerun diagnostics to verify fix.
	Amber	One failed power supply in the SAN Switch 2/16V	No action required, but failure of the remaining power supply will cause the switch to fail.

Port LED Patterns

Each port has two LEDs: a port speed and a port status indicator. [Table 11](#) shows the LED location, color, and meaning for these port LEDs.

Table 11: Port LED Patterns During Normal Operation

LED Name, Location	LED Color	Status of Hardware	Recommended Action
Port Status Below ports on left	No light	No light or signal carrier (transceiver or cable) detected.	Check transceiver and cable.
	Steady green	Port is online (connected to external device) but has no traffic.	No action required.
	Slow-flashing green (on 1 second, off 1 second)	Port is online but segmented, indicating a loopback cable or incompatible switch.	Verify that the correct device is connected to port and that the switch and port settings are correct.
	Fast-flashing green (on 1/4 second, off 1/4 second)	Port is in internal loopback (diagnostic).	No action required.
	Flickering green	Port is online with traffic flowing through port.	No action required.
	Steady amber	Port is receiving light or signal carrier, but is not yet online.	No action required.
Port Status Below ports on left	Slow-flashing amber (on 1 second, off 1 second)	Port is disabled as the result of diagnostics or portDisable command. If all ports are slow-flashing amber, the switch could be disabled.	Enable the port: use the portEnable command; refer to <i>HP StorageWorks Fabric OS Reference</i> for more information. If all ports are slow-flashing amber, enable the switch (switchEnable command).

Table 11: Port LED Patterns During Normal Operation (Continued)

LED Name, Location	LED Color	Status of Hardware	Recommended Action
	Fast-flashing amber (on 1/4 second, off 1/4 second)	Port is faulty.	Check the Port Status LEDs, error log, transceiver, and cable or loopback plug. Clear the error log. Rerun the diagnostics to verify that the error condition is fixed.
	Alternating green and amber	Port is bypassed.	Check configuration of Fibre Channel loop.
Port Speed Below ports on right	No light	Port is transmitting/receiving at 1 Gb/sec.	No action required.
	Steady green	Port is transmitting/receiving at 2 Gb/sec.	No action required.

Ethernet LED Patterns

Each Ethernet port has two LEDs, described in [Table 12](#).

Table 12: Ethernet LED Patterns

LED Name, Location	LED Color	Status of Hardware	Recommended Action
Ethernet speed Below port on right	No light	Port speed is 10 Mb/sec	No action required.
	Steady green	Port speed is 100 Mb/sec	
Ethernet link Below port on right	Amber	Link is valid traffic	No action required.
	Blinking green		

POST and Boot Specifications

When the switch is turned on or rebooted, the switch performs POST. Total boot time with POST is a minimum of 3 minutes.

POST can be omitted after subsequent reboots by using **fastboot**. For more information about this command, refer to the *HP StorageWorks Fabric OS Reference*.

POST

The success/failure results of the diagnostic tests that run during POST can be monitored through the error log or the command line interface.

POST includes the following steps:

1. Preliminary POST diagnostics are run.
2. Operating system is initialized.
3. Hardware is initialized.
4. Diagnostic tests are run on several functions, including circuitry, port functionality, memory, statistics counters, and serialization.

Boot

Boot completes in approximately 3 minutes if POST is run. In addition to POST, boot includes the following steps after POST is complete:

1. Universal port configuration is performed.
2. Links are initialized.
3. Fabric is analyzed, and if any ports are connected to other switches, the switch participates in a fabric configuration.
4. Switch obtains a domain ID and assigns port addresses.
5. Unicast routing tables are constructed.
6. Normal port operation is enabled.

Interpreting POST Results

POST is a system check that is performed each time the switch is powered on, rebooted, or reset. During POST, the LEDs flash different colors. Any errors that occur during POST are listed in the error log.

To determine that POST completed successfully and whether or not any errors were detected:

1. Verify that the switch LEDs indicate that all components are healthy. See [Table 11](#) on page 63 for description and interpretation of LED patterns. If one or more LEDs do not display a healthy state, verify that the LEDs on the switch are not set to “beacon”; use the **switchshow** command.
2. Verify the switch prompt displays on the terminal of a computer workstation connected to the switch. If there is no switch prompt when POST completes, press **Enter**. If the switch prompt still does not display, try opening another telnet session or accessing through another management tool. If this is not successful, the switch did not successfully complete POST; contact your switch supplier for repair.
3. Review the switch system log for errors. Any errors detected during POST are written to the system log, accessible through the **errshow** command.

For information about all referenced commands, and on accessing the error log, refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide*. For information about error messages, refer to the *HP StorageWorks Diagnostic and System Error Messages 4.2.x Reference Manual*.

Backing Up the Configuration and Upgrade Firmware

4

Once your SAN Switch 2/8V, 2/16V or 2/16N is installed and configured, you can monitor the health of the fabric as well as maintain the switch health. This chapter provides the following information:

- [SAN Switch 2/8V, 2/16V and 2/16N Management Features](#), page 68
- [Maintaining the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N](#), page 70

SAN Switch 2/8V, 2/16V and 2/16N Management Features

Using any of the management tools built into the SAN Switch 2/8V, 2/16V or 2/16N listed in [Table 13](#), you can monitor fabric topology, port status, physical status, and other information used for performance analysis and system debugging.

When running IP over Fibre Channel, these management tools must be run on both HBA and switch and must be supported by both HBA and HBA driver. For a list of HBAs supported by the SAN Switch 2/8V, 2/16V and 2/16N, contact your HP representative.

Table 13: Management Options

Management Tool	Out-of-Band Support	In-Band Support
Command line interface Up to two admin sessions and four user sessions simultaneously. For more information, refer to the <i>HP StorageWorks Fabric OS Procedures 4.2x User Guide</i> and the <i>HP StorageWorks Fabric OS 4.2.x Command Reference Guide</i> .	Ethernet or serial connection	IP over Fibre Channel
Advanced Web Tools For information, refer to the <i>HP StorageWorks Advanced Web Tools 4.2x User Guide</i> .	Ethernet connection	IP over Fibre Channel
Standard SNMP applications For information, refer to the <i>HP StorageWorks MIB 4.2x Reference Guide</i> .	Ethernet connection	IP over Fibre Channel
Management server For more information, refer to the <i>HP StorageWorks Fabric OS Procedures 4.2x User Guide</i> and the <i>HP StorageWorks Fabric OS 4.2.x Command Reference Guide</i> .	Ethernet connection	Native in-band interface (over HBA only)

A management station connected to one switch via Ethernet can also be used to manage other switches connected to the first switch via Fibre Channel. To do so, set the fibre channel gateway address of each of the other switches to be managed to the Fibre Channel IP address of the first switch. The gateway address of the first switch should be set to what ever the gateway address is for the subnet that the first switch resides on.

For example:

	Management Station	First Switch	Second Switch	Third Switch
Ethernet	192.168.1.09	192.168.1.10	204.1.1.11	204.1.1.12
FCIP	192.168.65.09	192.168.65.10	192.168.65.11	192.168.65.12
Gateway	192.168.1.10	any not self	192.168.1.10	192.168.1.10

The disadvantage of this method is the management station can not address anything but the switches.

Maintaining the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N

The SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N switches do not require any regular physical maintenance; they were designed to minimize the chance of failure.

Ensure that the environmental conditions, described in “[Technical Specifications](#)” on page 87, are met. This helps prevent failure of the switch due to distress or abuse.

Installing an SFP

If your switch did not come with installed SFPs, or you are replacing older ones, follow these instructions to install your SFP:

1. Making sure that the bale (wire handle) is in the unlocked position, and place the SFP in the correctly oriented position on the port, as shown in [Figure 19](#) on page 71.
2. Slide the SFP into the port until you feel it click into place and close the bale.

In some cases you might need to remove an SFP transceiver, either because it is no longer needed or because you must replace it.

To remove SFP transceivers:

1. Press and hold the cable release, as shown in [Figure 19](#) on page 71.
2. Remove the cable from the transceiver.
3. Pull the bale (wire handle) to release the transceiver.
4. Grasping it by the bale, gently but firmly pull the transceiver out of the port.



Caution: If the SFP you are removing does not have a bale, use a small implement such as a screwdriver to press the release trigger beneath the port. Non-baled SFPs can be damaged by the removal process and are not recommended. See “[Optional Hardware Kits](#)” on page 24 for a list of supported SFPs and devices.

5. Repeat this procedure for the remaining ports as required.

Figure 19 shows the SFP installation and removal steps.

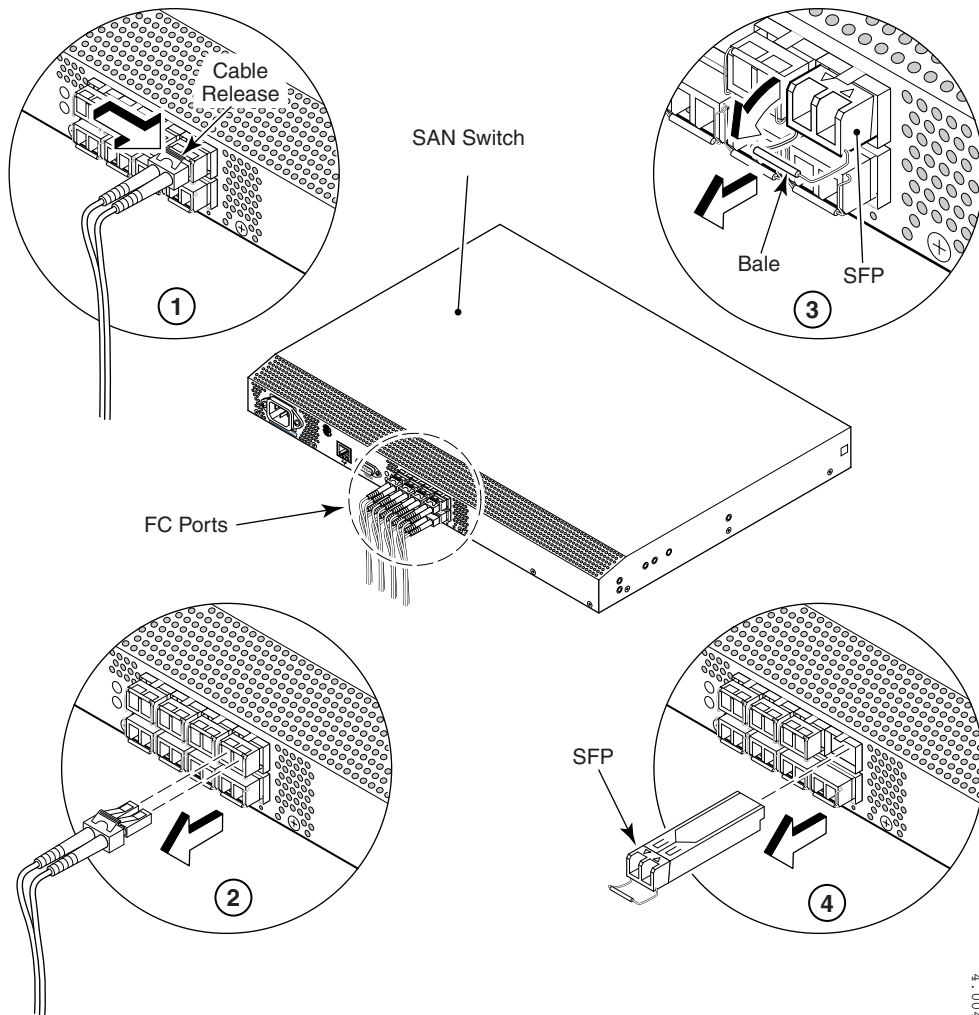


Figure 19: Installing or removing an SFP

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Removing an SFP

In some cases you might need to remove an SFP transceiver, either because it is no longer needed or because you must replace it.

To remove SFP transceivers:

1. Press and hold the cable release, as shown in [Figure 19](#) on page 71.
2. Remove the cable from the transceiver.
3. Pull the bale (wire handle) to release the transceiver.
4. Grasping it by the bale, gently but firmly pull the transceiver out of the port.



Caution: If the SFP you are removing does not have a bale, use a small implement such as a screwdriver to press the release trigger beneath the port. Non-baled SFPs can be damaged by the removal process and are not recommended. Refer to the *HP StorageWorks SAN Design Reference Guide* for a list of supported SFPs and devices.

5. Repeat this procedure for the remaining ports as required.

Diagnostic Tests

In addition to POST, Fabric OS includes diagnostic tests to help troubleshoot the hardware and the firmware. This includes tests of internal connections and circuitry, fixed media, and the transceivers and cables in use.

The tests are implemented by command, either through a telnet session or through a terminal set up for a serial connection to the switch. Some tests require the ports to be connected by external cables, to allow diagnostics to verify the serializer/deserializer interface, transceiver, and cable.

All diagnostic tests are run at link speeds of both 1 Gb/sec and 2 Gb/sec.



Caution: Diagnostic tests can temporarily lock the transmit and receive speed of the links during diagnostic testing.

For information about specific diagnostic tests, refer to the *HP StorageWorks Fabric OS Procedures 4.2x User Guide*.

Regulatory Compliance Notices



This appendix covers the following topics:

- [FCC EMC Statement \(USA\)](#), page 74
- [EMC Statement \(Canada\)](#), page 75
- [EMC Statement \(European Union\)](#), page 76
- [European Union Notice](#), page 77
- [Germany Noise Declaration](#), page 78
- [VCCI EMC Statement \(Japan\)](#), page 79
- [RRL EMC Statement \(Korea\)](#), page 80
- [Laser Safety](#), page 81
- [Battery Replacement Notice](#), page 83

FCC EMC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

The Regulatory Series Number is HSTNM-N001

EMC Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EMC Statement (European Union)

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

European Union Notice

Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22)—Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11)—Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2)—Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3)—Power Line Flicker
- EN 60950 (IEC 60950)—Product Safety

Germany Noise Declaration

Schalldruckpegel $L_p = 46.1$ dB(A) Am Arbeitsplatz (operator position) Normaler Betrieb (normal operation) Nach ISO 7779:1999 (Typprüfung)

VCCI EMC Statement (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

RRL EMC Statement (Korea)

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약
잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기
바랍니다.

Laser Safety

A. Certification and Classification Information

When equipped with native Fibre Channel adapters, this product contains a laser internal to the small form factor pluggable (SFP) transceiver modules.

In the USA, the SFP module is certified as a Class 1 Laser product, conforming to the requirements contained in Department Of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the metal SFP housing.

Outside the USA, the SFP is certified as a Class 1 Laser product conforming to requirements contained in IEC 825-1:1993 and EN60825-1:1994, including Amendment 11:1996.

The SFP includes the following certifications:

- UL Recognized Component (USA)
- CSA Certified Component (Canada)
- TUV Certified Component (European Union)
- CB Certificate (Worldwide)

The following figure shows the Class 1 information label that appears on the metal housing of the SFP.

CLASS 1 LASER PRODUCT 21 CFR(J)

B. Product Information

Each communications port consists of a transmitter and receiver optical subassembly. The transmitter subassembly contains internally a semiconductor laser diode in the wavelength of either 850 nanometers (shortwave laser) or 1310 nanometers (longwave laser).

Class 1 Laser products are not considered hazardous.

C. Usage Restrictions

Failure to comply with these usage restrictions may result in incorrect operation of the system and points of access may emit laser radiation above the Class 1 limits established by the IEC and U.S. DHHS.



WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation: Do not try to open the module enclosure. There are no user-serviceable components inside. Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein. Allow only HP Authorized Service technicians to repair the unit.

Battery Replacement Notice

Your switch is equipped with a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by an HP authorized service provider using the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP authorized reseller or your authorized service provider.



WARNING: Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery. There is risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
 - Do not expose to temperatures higher than 140°F (60°C).
 - Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
-

Batteries, battery packs, and accumulators should not be disposed of with the general household waste. Please use the public collection system for recycling or proper disposal or return them to HP, your authorized HP partners, or their agents.

Electrostatic Discharge

B

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

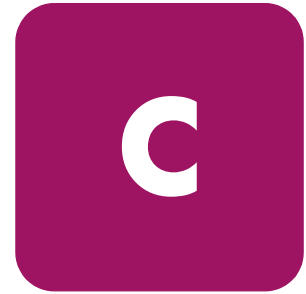
There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized reseller install the part.

Note: For more information on static electricity, or for assistance with product installation, contact your HP authorized reseller.

Technical Specifications



This appendix provides the following information:

- [Data Transmission Ranges](#), page 88
- [Fibre Channel Port Specifications](#), page 89
- [Serial Port Specifications](#), page 90
- [Power Supply Specifications](#), page 91
- [Weight and Physical Dimensions](#), page 92
- [Memory Specifications](#), page 93
- [Facility Requirements](#), page 95
- [Environmental Requirements](#), page 96
- [Supported HBAs](#), page 97
- [System Specifications](#), page 98

Data Transmission Ranges

Table 14 provides the data transmission ranges for different cable types and port speeds.

Table 14: Laser Data Transmission Ranges

Port Speed	Cable	Short Wavelength	Long Wavelength
1 Gb/sec	50μ	1,640 ft. (500 m.)	n/a
1 Gb/sec	62.5μ	984 ft.(300 m.)	n/a
1 Gb/sec	9μ	n/a	6.2 miles (10 km) Optional Long Wave SFPs are required.
2 Gb/sec	50μ	984 ft.(300 m.)	n/a
2 Gb/sec	62.5μ	492 ft.(150 m.)	n/a
2 Gb/sec	9μ	n/a	6.2 miles (10 km) without an HP Extended Fabrics license; 50 to 100 km with a HP Extended Fabrics license.

Fibre Channel Port Specifications

The Fibre Channel ports in the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N are compatible with SWL and LWL SFP transceivers. The strength of the signal is determined by the type of transceiver in use.

The ports meet all required safety standards. For more information about these standards, see “[Regulatory Compliance Notices](#)” on page 73.

The ports are capable of operating at 2.125 Gb/sec or 1.0625 Gb/sec, and are able to autosense the highest speed of which all attached devices are capable.

Serial Port Specifications

The serial port is located on the port side of the switch. It is a three-wire RS-232 port with a DB-9 male connector, designed to connect to a DTE port.

Note: To provide dust and ESD protection, keep the safety plug on the serial port whenever the port is not in use.

The serial port can be used to connect to a computer workstation to configure the switch IP address without connecting to the fabric. The serial port's parameters are 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

The port requires a straight (extension) serial cable with a female 9-pin subminiature-D connector. Only pins 2, 3, and 5 are supported.

Power Supply Specifications

The power supplies are universal and capable of functioning worldwide without using voltage jumpers or switches. They meet IEC 61000-4-5 surge voltage requirements and are autoranging in terms of accommodating input voltages and line frequencies. Each power supply has its own built-in fan for cooling, pushing the air toward the port side of the switch. Power supplies are not removable.

[Table 15](#) lists the power supply specifications.

Table 15: Power Supply Specifications

Specification	Value
Outlet	Correctly wired and earth-grounded
Maximum output from each power supply	SAN Switch 2/8V: 50 watts, with fans operating SAN Switch 2/16V: 75 watts, with fans operating
Maximum system power consumption	90 - 264 watts (depending on transceiver vendor)
Input voltage	100 - 240 VAC (nominal 80% efficiency), autoranging
Input line frequency	47 - 63 Hz
Harmonic distortion	Active power factor correction per IEC1000-3-2
BTU rating	SAN Switch 2/8V: 120 BTU SAN Switch 2/16V: 266 BTU
Inrush current	SAN Switch 2/8V: 20A SAN Switch 2/16V: 25A, each line input
Input line protection	Fused in both hot and neutral lines

Weight and Physical Dimensions

[Table 16](#) lists the weight and physical dimensions.

Table 16: Switch specifications

	SAN Switch 2/8V	SAN Switch 2/16V and SAN Switch 2/16N	Fixed-Rail Kit
Height	1.69 in (4.29 cm)	1.69 in (4.29 cm)	
Width	16.87 in (42.85 cm)	16.87 in (42.85 cm)	
Depth	12.10 in (30.734 cm)	12.10 in (30.734 cm)	
Weight	8.2 lb (3.72 kg) with no media installed	9.4 lb (4.27 kg) with no media installed	2.6 lb (1.18 kg)

Memory Specifications

Memory specifications are shown in [Table 17](#):

Table 17: Memory Specifications

Memory Type	Install Memory
Main Memory (SDRAM)	128 MB
Kernel Flash	16 MB
Boot Flash	512 KB
Compact Flash	256 MB

Supported SFPs

SFPs that have been tested and are known to work with the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N. See “[Optional Hardware Kits](#)” on page 24 for a list of supported SFPs. Do not use non-supported SFPs, as these can affect switch operability. They might not fit correctly and could void your warranty.

For a complete list of supported devices, contact your local HP Representative.

Facility Requirements

To ensure correct operation of the switch, the facility where the switch is in use must meet the following requirements shown in [Table 18](#):

Table 18: Facility Requirements

Type	Requirements
Electrical	<p>Primary AC Input 100-240 VAC, 1.5A, 47-63 Hz (SAN Switch 2/8V) and 100-240 VAC, 2.0A, 47-63 Hz (SAN Switch 2/16V); switch autosenses input voltage</p> <p>Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate</p> <p>Circuit protected by a circuit breaker and grounded in accordance with local electrical codes</p> <p>See Table 20 on page 98 for details</p>
Thermal	<p>A minimum air flow of 24 cubic ft/minute available in the immediate vicinity of the switch</p> <p>Ambient air temperature not exceeding 40° C (104° F) while the switch is operating</p>
Cabinet (when rack-mounted)	<p>One rack unit in a 19-in. (48.3 cm.) cabinet</p> <p>All equipment in cabinet grounded through a reliable branch circuit connection</p> <p>Additional weight of switch must not exceed the cabinet's weight limits</p> <p>Cabinet must be secured to insure stability in case of unexpected movement, such as an earthquake</p>

Environmental Requirements

To ensure proper operation, the switch must not be subjected to environmental conditions beyond those for which it was tested. The ranges specified in [Table 19](#) list the acceptable environment for both operating and non-operating conditions.

Table 19: Environmental Requirements

Condition	Acceptable Range During Operation	Acceptable Range During Non-operation
Temperature	-10° to +40° C (12° to 122° F)	-50° to 100° C (-122° to 212° F)
Humidity	20% to 85% RH non-condensing, at 40° C, with maximum gradient of 10% per hour	10% to 85% RH noncondensing, at 70° C
Altitude	0 to 10,000 ft (3 km) above sea level	0 to 39,370 ft (12 km) above sea level
Shock	20 G, 6 ms duration, half sine wave	15 G, 12-18 ms duration, trapezoid
Vibration	0.5 G, 5-500 Hz	2.0 G, 5-500 Hz
Air flow	Normal: 24 cubic ft/minute 1 fan failed remaining running at high speed): 30 cfm All fans running at high speed: 44 cfm	None required

Note: The 0° - 40° Celsius range applies to the ambient air temperature at the air intake vents on the nonport side of the switch. The temperature inside the switch can be up to 75° Celsius during switch operation.

If the internal temperature range exceeds the operating ranges of the components, the LEDs, error messages, and Fabric Watch alerts will indicate a problem. Enter the **tempshow** or Fabric Watch commands to view temperature status.

Supported HBAs

For a list of HBAs that have been tested and are known to work with the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N, contact your local HP Representative.

System Specifications

[Table 20](#) lists the system specifications for the SAN Switch 2/8V, SAN Switch 2/16V and SAN Switch 2/16N.

Table 20: General Specifications

Specification	Description
Configurable port types	F_Port, FL_Port, and E_Port
System architecture	Nonblocking shared-memory switch
System processor	PPC405GP, 200 MHz CPU
ANSI Fibre Channel protocol	FC-PH (Fibre Channel Physical and Signalling Interface standard)
Modes of operation	Fibre Channel Class 2, Class 3, Class F
Fabric initialization	Complies with FC-SW 5.0
FC-IP (IP over Fibre Channel)	Complies with FC-IP 2.3 of FCA profile

Table 20: General Specifications (Continued)

Aggregate switch I/O bandwidth	64 Gb/sec if all 16 ports running at 2 Gb/sec, full duplex
Port-to-port latency	Less than 2 microseconds with no contention (destination port is free)
EMC (electromagnetic compatibility)	<p>Emissions</p> <p>An operating SAN Switch 2/8V or SAN Switch 2/16V conforms to the emissions requirements specified by the following regulations:</p> <p>FCC Rules & Regulations, Part 15 subpart B, Class A</p> <p>CISPR22 Class A</p> <p>EN55022 Class A</p> <p>VCCI Class A ITE</p> <p>AS/NZS 3548 Class A</p> <p>CNS13438 Class A</p> <p>ICES-003 Class A</p> <p>Immunity</p> <p>IEC 61000-4-2 Severity Level 3 for Electrostatic Discharge</p> <p>IEC 61000-4-3 Severity Level 3 for Radiated Fields</p> <p>IEC 61000-4-4 Severity Level 3 for Fast Transients</p> <p>IEC 61000-4-5 Severity Level 3 for Surge Voltage</p> <p>IEC 61000-4-6 Conducted Emissions</p> <p>IEC 61000-4-11 Voltage Variations</p>

glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

A

AL_PA

Arbitrated loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

alias server

A fabric software facility that supports multicast group management.

API

Application programming interface. A defined protocol that allows applications to interface with a set of services.

AW_TOV

Arbitration wait time-out value. The minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

B

backup FCS switch

Backup fabric configuration server switch. The switch or switches assigned as backup in case the primary FCS switch fails.

bandwidth

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a link or system.

broadcast

The transmission of data from a single source to all devices in the fabric, regardless of zoning.

buffer-to-buffer flow control

Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop.

C

CLI

Command line interface. Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

compact flash

Flash (temporary) memory that is used in a manner similar to hard disk storage. It is connected to a bridging component which connects to the PCI bus of the processor. Not visible within the processor's memory space.

Configuration

The way in which a system is set up. May refer to hardware or software.

Hardware: The number, type, and arrangement of components that make up a system or network.

Software: The set of parameters that guide switch operation. May include general system parameters, IP address information, domain ID, and other information. Modifiable by any login with administrative privileges.

May also refer to a set of zones.

CRC

Cyclic redundancy check. A check for transmission errors that is included in every data frame.

D

data word

A type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words.

defined zone configuration

The set of all zone objects defined in the fabric. May include multiple zone configurations.

DLS

Dynamic load sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

domain ID

Unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch, but can be assigned manually. The domain ID for an HP switch can be any integer between 1 and 239. Generally, the default domain ID is 1.

E**E_D_TOV**

Error detect time-out value. The minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared.

E_Port

Expansion port. A type of switch port that can be connected to an E_Port on another switch to create an ISL.

EE_Credit

End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination.

EIA rack

A storage rack that meets the standards set by the Electronics Industry Association.

enabled zone configuration

The currently enabled configuration of zones. Only one configuration can be enabled at a time.

end-to-end flow control

Governs flow of class 1 and 2 frames between N_Ports.

error

As applies to fibre channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors).

exchange

The highest level fibre channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F

F_Port

Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch.

fabric

A fibre channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric.

fabric name

The unique identifier assigned to a fabric and communicated during login and port discovery.

FCIA

Fibre Channel Industry Association. An international organization of fibre channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards.

FCP

Fibre channel protocol. Mapping of protocols onto the fibre channel standard protocols. For example, SCSI FCP maps SCSI-3 onto fibre channel.

FCS switch

Fabric Configuration Server Switch. One or more designated HP switches that store and manage the configuration and security parameters for all switches in the fabric. FCS switches are designated by WWN, and the list of designated switches is communicated fabric-wide.

fill word

An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the fibre channel link active.

FL_Port

Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch.

FRU

Field-Replaceable Unit. A component that can be replaced on site.

FS

Fibre Channel Service. A service that is defined by fibre channel standards and exists at a well-known address. For example, the Simple Name Server is a fibre channel service.

FSP

Fibre channel service protocol. The common protocol for all fabric services, transparent to the fabric type or topology.

FSPF

Fabric shortest path first. HP's routing protocol for fibre channel switches.

Fx_Port

A fabric port that can operate as either an F_Port or FL_Port.

G**G_Port**

Generic port. A port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

H**hard address**

The AL_PA that an NL_Port attempts to acquire during loop initialization.

I**idle**

Continuous transmission of an ordered set over a fibre channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

integrated fabric

The fabric created by connecting multiple HP switches with multiple ISL cables, and configuring the switches to handle traffic as a seamless group.

ISL trunking

The distribution of traffic over the combined bandwidth of multiple ISLs. A set of trunked ISLs is called a "trunking group", and the ports in a trunking group are called "trunking ports".

isolated E_Port

An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs).

K

K28.5

A special 10-bit character used to indicate the beginning of a transmission word that performs fibre channel control and signaling functions. The first seven bits of the character are the comma pattern.

kernel flash

Flash (temporary) memory connected to the peripheral bus of the processor, and visible within the processor's memory space. Also known as “user flash”.

L

L_Port

Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes:

Fabric mode: Connected to a port that is not loop capable, and using fabric protocol.

Loop mode: In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode.

latency

The period of time required to transmit a frame, from the time it is sent until it arrives. Together, latency and bandwidth define the speed and capacity of a link or system.

link

As applies to fibre channel, a physical connection between two ports, consisting of both transmit and receive fibres.

link services

A protocol for link-related actions.

LIP

Loop initialization primitive. The signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.

LM_TOV

Loop master time-out value. The minimum time that the loop master waits for a loop initialization sequence to return.

loop failure

Loss of signal within a loop for any period of time, or loss of synchronization for longer than the time-out value.

loop initialization

The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.

Loop_ID

A hex value representing one of the 127 possible AL_PA values in an arbitrated loop.

LPSM

Loop Port State Machine. The logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.

LWL

Long wavelength. A type of fiber optic cabling that is based on 1300nm lasers and supports link speeds up to 2 Gbit/sec. May also refer to the type of transceiver.

M

master port

The port that determines the routing paths for all traffic flowing through a trunking group. One of the ports that is in the first ISL in the trunking group is designated as the master port for that group.

MIB

Management Information Base. An SNMP structure to help with device management, providing configuration and device information.

multicast

The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network).

P

N_Port

Node port. A port on a node that can connect to a fibre channel port or to another N_Port in a point-to-point connection.

name server

Frequently used to indicate Simple Name Server.

NL_Port

Node loop port. A node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port.

node

A fibre channel device that contains an N_Port or NL_Port.

non-participating mode

A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired.

Nx_Port

A node port that can operate as either an N_Port or NL_Port.

P

packet

A set of information transmitted across a network.

participating mode

A mode in which an L_Port in a loop has a valid AL_PA and can arbitrate, send frames, and retransmit received transmissions.

path selection

The selection of a transmission path through the fabric. HP switches use the FSPF protocol.

phantom address

An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.

phantom device

A device that is not physically in an arbitrated loop but is logically included through the use of a phantom address.

PLOGI

Port login. The port-to-port login process by which initiators establish sessions with targets.

point-to-point

A fibre channel topology that employs direct links between each pair of communicating entities.

port cage

The metal casing extending out of the fibre channel port on the switch, and into which a GBIC or SFP transceiver can be inserted.

Port_Name

The unique identifier assigned to a fibre channel port. Communicated during login and port discovery.

POST

Power On Self-Test. A series of tests run by a switch after it is powered on.

primary FCS switch

Primary fabric configuration server switch. The switch that actively manages the configuration and security parameters for all switches in the fabric.

private loop

An arbitrated loop that does not include a participating FL_Port.

private NL_Port

An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.

public device

A device that supports arbitrated loop protocol, can interpret 8-bit addresses, and can log into the fabric.

public loop

An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.

public NL_Port

An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

Q

quad

A group of four adjacent ports that share a common pool of frame buffers.

R

R_A_TOV

Resource allocation time-out value. The maximum time a frame can be delayed in the fabric and still be delivered.

RAID

Redundant Array Of Independent Disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking.

request rate

The rate at which requests arrive at a servicing entity.

route

As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination.

routing

The assignment of frames to specific switch ports, according to frame destination.

RR_TOV

Resource recovery time-out value. The minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator.

RSCN

Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes.

S

SAN

Storage Area Network. A network of systems and storage devices that communicate using fibre channel protocols.

SDRAM

The main memory for the switch.

sequence

A group of related frames transmitted in the same direction between two N_Ports.

service rate

The rate at which an entity can service requests.

single mode

The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.

SNMP

Simple Network Management Protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols.

SNS

Simple Name Server. A switch service that stores names, addresses, and attributes for up to 15 minutes, and provides them as required to other devices in the fabric. SNS is defined by fibre channel standards and exists at a well-known address. May also be referred to as directory service.

switch

Hardware that routes frames according to fibre channel protocol and is controlled by software.

switch port

A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

SWL

Short wavelength. A type of fiber optic cabling that is based on 850nm lasers and supports link speeds up to 2 Gbit/sec. May also refer to the type of transceiver.

T

tenancy

The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.

throughput

The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second).

topology

As applies to fibre channel, the configuration of the fibre channel network and the resulting communication paths allowed. There are three possible topologies:

Point to point: A direct link between two communication ports.

Switched fabric: Multiple N_Ports linked to a switch by F_Ports.

Arbitrated loop: Multiple NL_Ports connected in a loop.

transmission character

A 10-bit character encoded according to the rules of the 8b/10b algorithm.

transmission word

A group of four transmission characters.

trap (SNMP)

The message sent by an SNMP agent to inform the SNMP management station of a critical error.

U

U_Port

Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

W

well-known address

As pertaining to fibre channel, a logical address defined by the fibre channel standards as assigned to a specific function, and stored on the switch.

workstation

A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN

World Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

Z

zone

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone.

zone configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration.

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